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Fakultät für
Mathematik, Informatik
und Naturwissenschaften

Kolloquium über Mathematische Statistik und Stochastische Prozesse

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On the smooth fit principle in optimal stopping

The principle of smooth fit is probably the most used tool to find solutions to optimal stopping problems of one-dimensional diffusions. The principle says that the value function of an optimal stopping problem meets the reward function smoothly at a stopping point in case the reward is differentiable at this point. However, the principle does not always hold and it is important, e.g., for financial mathematical applications to understand in which kind of models and problems this may happen.

The talk begins with a short survey on optimal stopping and smooth fit. We are mainly considering one-dimensional diffusions but discuss also some results for Lévy processes.

For diffusions the validity of smooth fit is effectively studied via the differentiability properties of excessive functions. We use the representation theory of excessive functions, in particular, the Riesz and Martin representations, to show that typically an excessive function is non-differentiable at points where the speed measure of the diffusion or the representing measure of the excessive function has atoms.

As an example, we study an optimal stopping problem for sticky Brownian motion which exhibits smooth fit or non-smooth fit at the stopping point depending on the value of the discounting.

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